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REMARKS

Claims 1-57 remain rejected, now under 35 U.S.C. §103(a) as being unpatentable over Haga et al., U.S. Patent No. 5,541,900 ("Haga") in view of Paul, U.S. Patent No. 6,198,417 B1 ("Paul"). This rejection is respectfully traversed and it is submitted that these claims recite subject matter which is patentable over Haga and Paul.

As in a previous response (Amendment C), for purposes of this discussion concerning "integrating circuit 10", "amplitude modulation circuit 40" and "feedback circuit 30" of Haga, such elements of Haga may be discussed as though analogous to the presently recited "integration stage", "modulation stage" and "first feedback stage", respectively. However, any such discussion is merely to allow distinctions between the presently claimed subject matter and that disclosed by Haga to be more easily focused upon. No admissions are made or implied nor are any admissions to be inferred regarding any similarities, to the extent any may exist, between such elements or their respective functions.

Regarding claims 1, 20 and 39, the Examiner correctly notes that Haga does not teach "a modulation stage [which provides] a discrete time pulse width modulated signal" as presently recited. However, the Examiner then contends that Paul teaches providing discrete time pulse width modulation in conjunction with a "modulation stage" and an "integration stage". In support of this, the Examiner cites column 1, lines 25-26, of Paul, apparently in reference to the discussion there regarding "discrete-time integrator 106" in Figure 1.

Apparently as the motivation for combining the purported teachings of Haga and Paul, the Examiner states that "[i]t would have been obvious to one of ordinary

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skill in the art to implement the discrete time of Paul into Haga as to accurately analyze the modulator by modeling ideal quantization noise and other sources of non-ideal noise introduced by the ADC converter." The source of the teaching or suggestion of such a motivation (to analyze a modulator by modeling noise?) is not cited. It is unclear whether it is a modulator of Haga or a modulator of Paul that would have been the intended beneficiary of such analysis based upon noise modeling.

Further, it is not seen how either of the Haga or Paul disclosures would be suggestive of a motivation related to analysis based upon noise modeling. While Haga is directed to a "pulse width modulation circuit" (as per its title), Paul is directed to a "pipelined oversampling A/D converter" (as per its title). Such elements are quite distinct from one another in terms of their respective functions. While an analog-to-digital converter (ADC), such as the type discussed in Paul, is a basic functional element that can be used in many applications, the use of an ADC specifically in a pulse width modulation circuit is not the primary use. Indeed, Haga contains no mention whatsoever of an ADC. Hence, it is respectfully submitted that it would not have been obvious to one of ordinary skill in the art to combine the subject matter of Paul with that of Haga and, therefore, independent claims 1, 20 and 39 are patentable over Haga and Paul.

Accordingly, it is further submitted that dependent claims 2-19, 21-38 and 40-57 are also patentable over Haga and Paul, particularly in view of the further limitations in these latter claims. More particularly, regarding claims 2, 21 and 40, the Examiner cites language from Haga regarding an "adder" and an "integration stage" without identifying any relationship(s) of such elements to the structure recited in the present claims. Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is

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unpatentable over Haga and Paul.

Regarding claims 3, 22 and 41, the Examiner merely states, with no supporting citation(s) whatsoever, that "the apparatus of Haga would include a feed forward circuit as to accurately analyze the modulator by modeling ideal quantization noise and other sources of non-ideal noise introduced by the feed forward ADC converter." As discussed hereinabove, the source of the teaching or suggestion of such a motivation (to analyze a modulator by modeling noise?) is also not cited. Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

Regarding claims 5, 24 and 43, the Examiner states that "element 10" of Haga is a "sampled integrator circuit". However, no mention of a "sampled integrator circuit" could be found in Haga. Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

Regarding claims 6, 7, 25, 26, 44 and 45, the Examiner merely states, with no supporting citation(s) whatsoever, that "the apparatus of Haga would include a quantization stage as to accurately analyze the modulator by modeling ideal quantization noise and other sources of non-ideal noise introduced by the feed forward ADC converter", and does so without identifying any relationship(s) of such element to the structure recited in the present claims. First, as discussed hereinabove, the source of the teaching or suggestion of such a motivation (to analyze a modulator by modeling noise?) is also not cited. Second, the Examiner has not accounted for another element recited in these claims, i.e., "a pulse width modulation stage". Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

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Regarding claims 8, 27 and 46, the Examiner merely states that Haga teaches "a pulse width modulation stage" without identifying the elements of Haga corresponding to its recited elements ("input stage" and "output stage"). Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

Regarding claims 9, 28 and 47-49, the Examiner cites column 14, lines 58-67, of Haga as teaching "a continuous integration stage". However, the "integrating circuit 11" discussed there is in the forward signal path, not the feedback signal path. Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

Regarding claim 10, the Examiner cites column 1 of Haga in its entirety as teaching "a first feedback stage having a discrete time". No elements or specific description is noted, thereby requiring one to guess where such an element might possibly be taught. Indeed, column 1 of Haga does not even refer to a drawing, figure or schematic of any kind. Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of this claim is unpatentable over Haga and Paul.

Regarding claims 11, 29 and 30, the Examiner cites column 11, line 27, of Haga as teaching "a filter". However, the "low-pass filter 80" discussed there is in the forward signal path, not the feedback signal path. Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

Regarding claims 12, 31 and 50, the Examiner states that the apparatus of Haga inherently includes a second feedback stage without identifying any basis whatsoever

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for such a conclusion, much less how or why a second feedback stage with the structure(s) and/or function(s) as expressly recited in these claims would be inherent. Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

Regarding claims 13, 32 and 51, the Examiner merely states that Haga would include a second adder as to accurately remove or reduce ideal quantization noise and other sources of non-ideal noise introduced by the ADC converter", and does so without identifying any relationship(s) of such element to the structure recited in the present claims. First, similar to a related discussion hereinabove, the source of the teaching or suggestion of such a motivation (removal or reduction of noise?) is also not cited. Second, the Examiner has not accounted for the other elements and functions recited in these claims. Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

Regarding claims 14, 33 and 52, the Examiner cites column 14, lines 58-67, of Haga as teaching "a continuous integration stage". However, even if such teaching of Haga applies to the presently recited "continuous-time integrator circuit", a corresponding "sampled integrator circuit" as part of the recited common "integration stage" has not been identified in Haga. Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

Regarding claims 15, 16, 34, 35, 53 and 54, the Examiner merely states, with no supporting citation(s) whatsoever, that "the apparatus of Haga would include a quantization stage as to accurately analyze the modulator by modeling ideal quantization noise and other sources of non-ideal noise introduced by the ADC

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converter", and does so without identifying any relationship(s) of such element to the structure recited in the present claims. First, as discussed hereinabove, the source of the teaching or suggestion of such a motivation (to analyze a modulator by modeling noise?) is also not cited. Second, the Examiner has not accounted for another element recited in these claims, i.e., "a pulse width modulation stage". Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

Regarding claims 17, 36 and 55, the Examiner merely states that Haga teaches "a pulse width modulation stage" without identifying the elements of Haga corresponding to its recited elements ("input stage" and "output stage"). Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

Regarding claims 18 and 37, the Examiner cites column 14, lines 58-67, of Haga as teaching "a continuous integration stage". However, the "integrating circuit 11" discussed there is in the forward signal path, not the feedback signal path. Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

Regarding claims 19, 38, 56 and 57, the Examiner cites column 11, line 27, of Haga as teaching "a filter". However, the "low-pass filter 80" discussed there is in the forward signal path, not the feedback signal path. Hence, it is respectfully submitted that the Examiner has not adequately demonstrated how or why the subject matter of these claims is unpatentable over Haga and Paul.

It is submitted that the foregoing remarks are in complete conformance with those submitted in Amendments A, B and C, and do not raise any new issues that

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would require "further consideration or search" such as to prevent entry of this response and issuance of the pending claims in their present forms. Accordingly, it is respectfully requested that this Amendment be entered and the presently pending claims be allowed and proceed to issuance. To expedite this, the Examiner is respectfully requested to contact the undersigned by telephone to discuss any questions, comments or concerns.

Respectfully submitted,

VEDDER, PRICE, KAUFMAN &amp; KAMMHOLZ, P.C.

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